NASA TECH BRIEF

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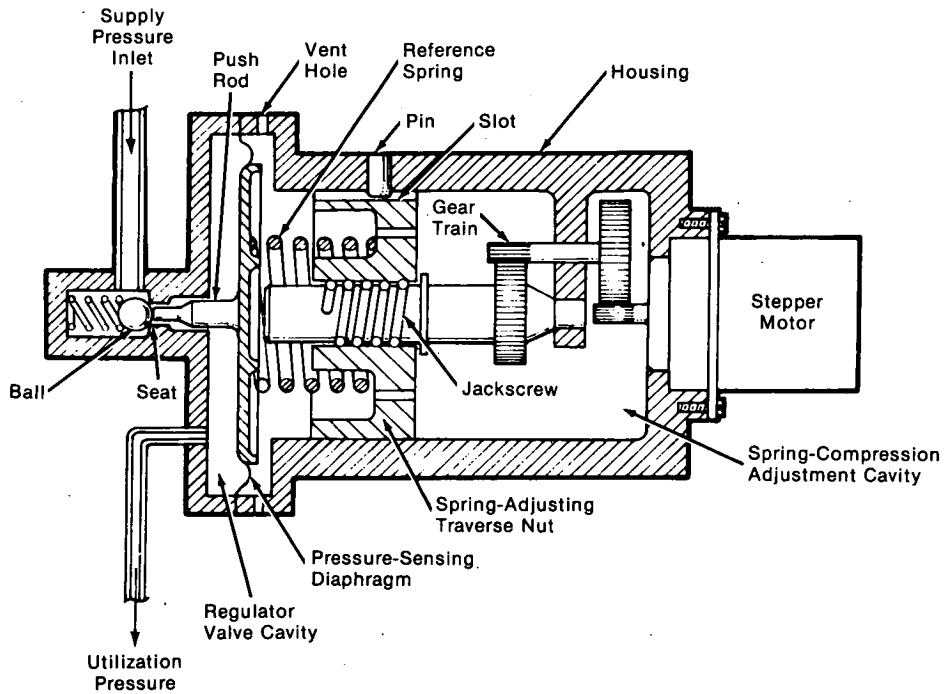
Remotely Operated Gas-Pressure Regulator and Shutoff Valve



Valve Configuration

The problem:

Usually differently designed valves are used to provide gas-pressure regulation and to shut off flow. Those that do both functions lack the fine precision necessary in critical applications and are incapable of being operated from a remote location.

The solution:

A new valve features precise gas-pressure regulation and shuts off flow by remote control.

How it's done:

The valve as shown in the illustration includes a housing which is made up of a regulator valve cavity and a spring-compression adjustment cavity. The elements in the regulator cavity are conventional and include a high-pressure inlet, a ball which mates with a seat, a push rod, and a pressure-sensing diaphragm. The push rod is attached to the diaphragm and bears against the ball to open the valve. This occurs when the force applied by the reference spring is greater than the regulated gas pressure multiplied by the area of the diaphragm.

In the spring cavity, a spring-adjusting traverse nut which is axially translatable serves as a spring stop. With the nut in its left position, the spring is compressed to apply a reference force needed for normal operation as a gas-pressure regulator. As the

(continued overleaf)

reference spring relaxes, the regulated gas pressure multiplied by the diaphragm area required to balance the spring force lessens, reducing the regulated gas utilization pressure accordingly. Normally this balance is set so that the line pressure of the gas emerging from the device is held close to 10.4×10^4 N/m^2 (15 psi). The intermediate positions of the adjustment nut can also be used to apply different amounts of force to the diaphragm. This regulates the line pressure accordingly. Different springs can be used also to obtain desired operational characteristics.

When the nut is translated to the extreme right, the spring exerts no force on the diaphragm, allowing the push rod to withdraw from the ball. The ball then is pressed against the seat by the high inlet line pressure, cutting off the gas supply.

The traverse nut is translated axially by means of a ball-bearing jackscrew which mates with an internal thread in the nut. The screw is rotated through a gear train driven by a reversible stepper motor that can be operated remotely by wire or by telemetry. The nut is prevented from rotating with the screw by a pin fixed in the housing which mates with a longitudinal slot in the nut.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
NASA Pasadena Office
4800 Oak Grove Drive
Pasadena, California 91103
Reference: TSP74-10298

Patent status:

This invention has been patented by NASA (U.S. Patent No. 3,856,042). Inquiries concerning non-exclusive or exclusive licence for its commercial development should be addressed to:

Patent Counsel
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Categories: 07 (Machinery)
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